

In the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

What is Claimed is:

1. (currently amended) A corneal contact lens comprising
a central zone having a posterior surface curvature,

a connecting zone having a posterior surface and provided adjacent and concentric to said central zone, said connecting zone having a shape defined as a sigmoidal curve, and

at least one peripheral zone having a posterior surface and provided adjacent and concentric to said connecting zone, wherein the sigmoidal curve of the connecting zone is spaced from the cornea substantially over its extent to create a void space thereunder when the lens is positioned on the cornea of a patient.
2. (original) A corneal contact lens according to claim 1 wherein the curvature of the central zone is spherical.
3. (currently amended) A corneal contact lens comprising
a central zone having a posterior surface curvature, according to claim 1 wherein the curvature of the central zone is toric,
a connecting zone having a posterior surface and provided adjacent to said central zone, said connecting zone having a shape defined as a sigmoidal curve, and
at least one peripheral zone having a posterior surface and provided adjacent to said connecting zone.
4. (original) A corneal contact lens according to claim 1 wherein the curvature of the central zone is aspherical.

5. (original) A corneal contact lens according to claim 4 wherein the curvature of the central zone comprises a combination of annular spherical and aspherical zones.

6. (currently amended) A corneal contact lens according to claim 5-1 wherein the ~~curvature of the central zone, connecting zone and at least one peripheral zone each have appreciable width, such that the central zone overlays a significant portion of the central cornea and the at least one peripheral zone overlays a significant portion of the peripheral cornea~~ comprises a combination of spherical and aspherical zones.

7. (currently amended) A corneal contact lens comprising
a central zone having a posterior surface curvature, according to claim 1 wherein the central zone is designed to correct presbyopia without contacting the cornea,

a connecting zone having a posterior surface and provided adjacent to said central zone, said connecting zone having a shape defined as a sigmoidal curve, and

at least one peripheral zone having a posterior surface and provided adjacent to said connecting zone.

8. (currently amended) A corneal contact lens comprising
a central zone having a posterior surface curvature, according to claim 1 wherein the central zone is designed to correct presbyopia by reshaping the cornea,

a connecting zone having a posterior surface and provided adjacent to said central zone, said connecting zone having a shape defined as a sigmoidal curve, and

at least one peripheral zone having a posterior surface and provided adjacent to said connecting zone.

9. (currently amended) A corneal contact lens according to claim 1 wherein the meridional profile of the connecting zone is shaped such that the portion adjacent the central zone is

substantially to matched to the slopes of the central zone and the portion adjacent the peripheral zone is substantially matched to the slope of ~~and the at least one peripheral zone on adjacent sides.~~

10. (currently amended) A corneal contact lens according to claim 1 wherein the meridional profile of the connecting zone is described by a predetermined its axial length and horizontal width.

11. (currently amended) A corneal contact lens according to claim 1 wherein each of the zones is independently designed, and the junctions between the connecting zone to the central zone and the at least one peripheral zone require substantially no polishing or blending.

12. (currently amended) A corneal contact lens according to claim 10 wherein the meridional profile of the connecting zone is described by $y_s := A \cdot x^3 + B \cdot x^2 + C \cdot x + D$ (Eq. 1)

with the Y value for the junction (J_1) between the central zone and connecting zone defined by the equation

$$y_{j1} := \sqrt{r_b^2 - J_1^2} \quad (\text{Eq. 2})$$

wherein $r(\text{sub})b$ is the radius of the central zone, and the X value for the junction (J_2) between the connecting zone and peripheral zone defined by the equation

$$x_{j2} := J_1 + W \quad (\text{Eq. 3})$$

while the Y value for the junction J_2 is defined by the equation

$$y_{j2} := y_{j1} - L \quad (\text{Eq. 4})$$

with the coefficients A, B, C, D of Equation 1 are defined by Equations 5–8 as follows:

$$A := \frac{\left[\frac{-1}{(2J_1 - 2x_{j2})^M} - \frac{1}{(2J_1 - 2x_{j2})} \sqrt{r_b^2 - J_1^2} \right] J_1 + \left(\frac{1}{J_1^2 - 2J_1 x_{j2} + x_{j2}^2} \right)^{J_1 M} + \left(\frac{1}{J_1^2 - 2J_1 x_{j2} + x_{j2}^2} \right)^{y_{j2}} - \left(\frac{1}{J_1^2 - 2J_1 x_{j2} + x_{j2}^2} \right)^{x_{j2} M} - \left(\frac{1}{J_1^2 - 2J_1 x_{j2} + x_{j2}^2} \right) \sqrt{r_b^2 - J_1^2}}{\left[\frac{-3}{(2J_1 - 2x_{j2})} J_1^2 + \frac{3}{(2J_1 - 2x_{j2})} x_{j2}^2 + \left(\frac{1}{J_1^2 - 2J_1 x_{j2} + x_{j2}^2} \right) J_1^3 - \left(\frac{3}{J_1^2 - 2J_1 x_{j2} + x_{j2}^2} \right) J_1 x_{j2}^2 + \left(\frac{2}{J_1^2 - 2J_1 x_{j2} + x_{j2}^2} \right) x_{j2}^3 \right]} \quad (\text{Eq. 5})$$

$$B := \frac{-\left(A \cdot J_1^3 - 3 \cdot J_1 \cdot A \cdot x_{j2}^2 + J_1 \cdot M + y_{j2} + 2 \cdot A \cdot x_{j2}^3 - x_{j2} \cdot M - \sqrt{r_b^2 - J_1^2}\right)}{\left(J_1^2 - 2 \cdot J_1 \cdot x_{j2} + x_{j2}^2\right)} \quad (\text{Eq. 6})$$

$$C := -3 \cdot A \cdot x_{j2}^2 - 2 \cdot B \cdot x_{j2} + M \quad (\text{Eq. 7})$$

$$D := y_{j2} + 2 \cdot A \cdot x_{j2}^3 + B \cdot x_{j2}^2 - x_{j2} \cdot M \quad (\text{Eq. 8})$$

13. (currently amended) A corneal contact lens comprising

a central zone having a posterior surface curvature,

a connecting zone having a posterior surface and provided adjacent to said central zone, said connecting zone having a shape defined as a sigmoidal curve, and

at least one peripheral zone having a posterior surface and provided adjacent to said connecting zone according to claim 1 wherein the at least one peripheral zone is formed as a truncated conoid conoid, and the relationship of the meridional profile of the at least one peripheral zone to the meridional profile of the connecting zone is described by the angle the meridional profile the at least one peripheral zone makes with a line perpendicular to the central axis of the lens.

14. (currently amended) A corneal contact lens comprising

a central zone having a posterior surface curvature,

a connecting zone having a posterior surface and provided adjacent to said central zone, said connecting zone having a shape defined as a sigmoidal curve, and

at least one peripheral zone having a posterior surface and provided adjacent to said connecting zone according to claim 1 wherein the at least one peripheral zone is formed as a truncated conoid conoid and the meridional profile of the at least one peripheral zone is described by the angle it makes with a line perpendicular to the central axis of the lens, its curvature and its extension.

15. (original) A corneal contact lens according to claim 1 wherein the meridional profile of the at least one peripheral zone is substantially uncurved over at least a substantial portion thereof.

16. (currently amended) A corneal contact lens according to claim 1 wherein the meridional profile of the at least one peripheral zone includes a width which is substantially flat and is terminated by a rounded shape directed away from the underlying cornea, to thereby provide edge lift~~smooth edge~~
~~contour~~.

17. (currently amended) A corneal contact lens according to claim 1 wherein the meridional profile of the at least one peripheral zone is modeled as the quadrant of ~~an~~the ellipse having an ellipse center on an imaginary dividing line between the posterior and anterior surfaces of the lens which merges with the profile of the at least one peripheral zone and replaces that portion of the meridional profile of the peripheral zone in that region beyond the intersection of the short axis of the ellipse and the profile of the peripheral zone.

18. (original) A corneal contact lens according to claim 17 wherein the dividing line is chosen to be at a location 10 to 90% of the thickness of the lens from the posterior to the anterior surfaces and the long axis of the ellipse chosen to be about 0.01mm to 2.0 mm in length.

19. (currently amended) A corneal contact lens according to claim 1 wherein the anterior surface of said lens is comprised of surfaces selected from the group consisting of contiguous spherical surfaces, contiguous aspherical surfaces, toric surfaces or combinations thereof.

20. (original) A corneal contact lens according to claims 1 wherein the anterior surface of said lens is made to substantially the same shape as the posterior surface of said contact lens.

21. (original) A corneal contact lens according to claim 1, wherein the posterior curve of said central zone in combination with the anterior surface curve will yield a desired optical power in said contact lens.

22. (original) A corneal contact lens according to claim 1 wherein the anterior surface of said contact lens is designed to have analogous elements to said posterior surface and said analogous elements of the anterior and posterior surfaces are equally spaced from each other.

23. (currently amended) A corneal contact lens comprising
a central zone having a posterior surface curvature,
a connecting zone having a posterior surface and provided adjacent to said central zone, said
connecting zone having a shape defined as a sigmoidal curve, and
at least one peripheral zone having a posterior surface and provided adjacent to said connecting
zone, according to claim 1 wherein the anterior surface of said contact lens is designed to have analogous elements to said posterior surface and said analogous elements of the anterior and posterior surfaces are unequally spaced from each other.

24. (currently amended) A corneal contact lens according to claim 1 wherein different {meridional surface profiles for each of said zones are designed at different angles of rotation about the lens central axis.

25. (currently amended) A contact lens comprising:
a central zone having a posterior surface with a curvature;
a connecting zone having a posterior surface provided adjacent ~~and concentric~~ to said central zone,
and
at least one peripheral zone having a posterior surface provided adjacent ~~and concentric~~ to said connecting zone, said peripheral zone being integral with said connecting zone and being formed as a truncated conoid over at least a substantial portion thereof, wherein the lens is designed to impart desired forces to said cornea to alter the shape of the cornea in a predetermined manner.

26. (currently amended) A contact lens according to claim 25 wherein the meridional profile of the at least one peripheral zone is modeled as the quadrant of ~~the an~~ ellipse having an ellipse center on an imaginary dividing line between the posterior and anterior surfaces of the lens which merges with the

profile of the at least one peripheral zone and replaces that portion of the meridional profile of the peripheral zone in that region beyond the intersection of the short axis of the ellipse and the profile of the peripheral zone.

27. (original) A contact lens according to claim 25 wherein the parameters of connecting zone depth and peripheral zone angle are derived by fitting lenses on the cornea of a patient from one or more fitting sets selected from the group of fitting lenses having a fixed base curve and a fixed peripheral zone angle with a series of connecting zone depths, having a fixed connecting zone depth and a fixed peripheral zone angle and a series of base curves, having a fixed connecting zone depth and a fixed base curve with a series of peripheral zone angles, or sets of these three types contain one or more lenses that are marked with a plurality of visible concentric rings.

28. (original) A contact lens comprising:

a central zone having a posterior surface with a curvature;
a connecting zone having a posterior surface provided adjacent to said central zone, and
at least one peripheral zone having a posterior surface provided adjacent to said connecting zone,
said peripheral zone being integral with said connecting zone and being formed as a truncated conoid
over at least a substantial portion thereof, according to claim 25 wherein the lens has a plurality of visible concentric rings formed over at least a portion thereof.

29 through 44. (Cancelled)

45. (new) The corneal contact lens of claim 1, wherein each of the central, connecting and at least one peripheral zones has a width over 1.0 mm.

46. (new) The corneal contact lens of claim 1, wherein the lens is designed to impart desired forces to said cornea to alter the shape of the cornea in a predetermined manner.

47. (new) A corneal contact lens comprising
a central zone having a posterior surface curvature,

_____ a connecting zone having a posterior surface and provided adjacent to said central zone, said connecting zone having a shape defined as a sigmoidal curve, and

_____ at least one peripheral zone having a posterior surface and provided adjacent to said connecting zone, wherein the central zone and the at least one peripheral zone are designed independently from one another such that each of the central and at least one peripheral zone have a width positioned relative to a predetermined portion of the cornea on which the lens is placed, and the connecting zone being independently designed to connect to the central zone at the periphery of the central zone, and to the at least one peripheral zone at the periphery of the connecting zone, with the connecting zone being shaped such that the portion adjacent the central zone is matched to the slope of the central zone and the portion adjacent the peripheral zone is matched to the slope of the at least one peripheral zone.

48. (new) The corneal contact lens of claim 47, wherein the lens is designed to impart desired forces to said cornea to alter the shape of the cornea in a predetermined manner.

49. (new) A corneal contact lens comprising,

_____ a central zone having a first width,

_____ at least one peripheral zone having a second width, and

_____ a connecting zone positioned between the central and at least one peripheral zone and having a shape defined by a sigmoidal curve, the connecting zone having a third width, wherein the first and second widths are greater than the third width.

50. (new) The corneal contact lens of claim 49, wherein the lens is designed to impart desired forces to said cornea to alter the shape of the cornea in a predetermined manner.

51. (new) A contact lens comprising:

_____ a central zone having a posterior surface with a curvature;

a connecting zone having a posterior surface provided adjacent to said central zone, said connecting zone having a shape defined as a sigmoidal curve and

at least one peripheral zone having a posterior surface provided adjacent to said connecting zone,
wherein the lens has a plurality of visible concentric rings formed over at least a portion thereof.